Valuing Energy Resiliency

Western Missouri Combined Heat and Power Summit
October 16, 2018

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“Been there, done that!”

Worked as a Facility Manager/Director of Engineering for 20 years

Worked at Large Academic Medical Center and Small Rural Hospital

Managed and Operated Essential Electrical Systems

Have Experienced Power Outages/Electrical Failures
“Grid Damage” due to Accidents/Critters/Mother Nature
System Damage Due to Construction/Wear & Tear
Outages due to “Normal” Events

LIFE HAPPENS

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Who is ASHE?

Professional membership group of the AHA

Largest association devoted to professionals who design, build, maintain, and operate hospitals and other health care facilities

Over 13,000 Members

Trusted industry resource that provides regulatory guidance, advocacy representation, and professional development

Mission

Dedicated to optimizing the health care physical environment.

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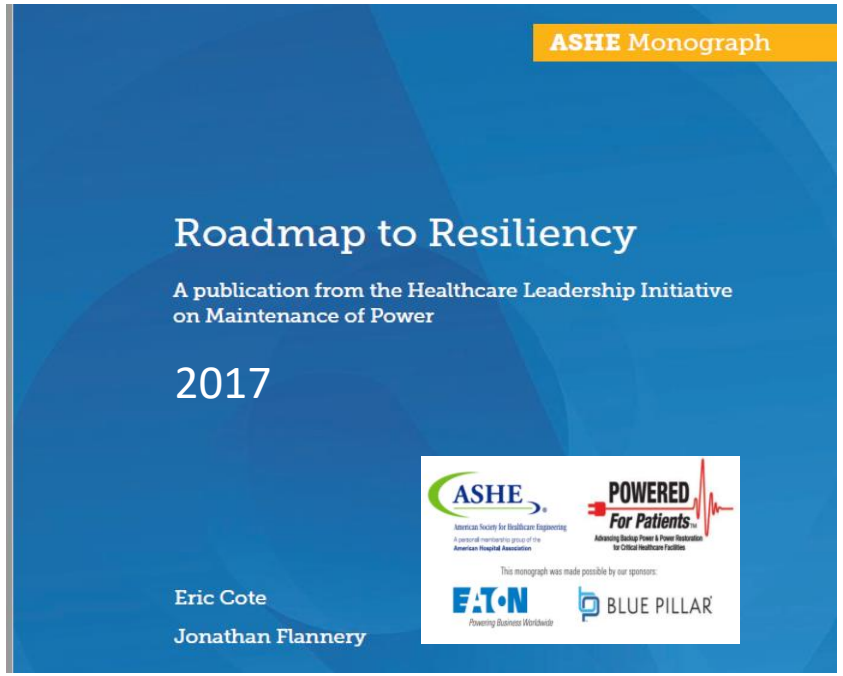

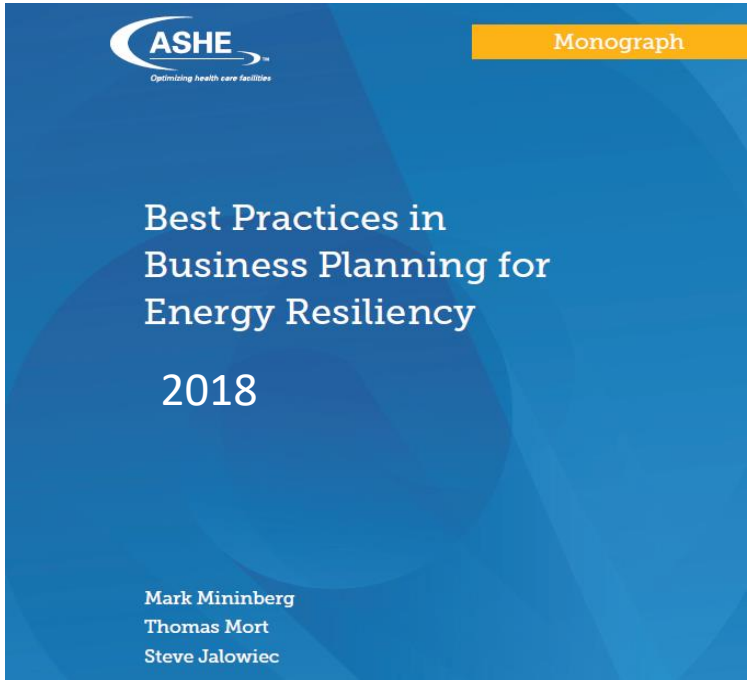

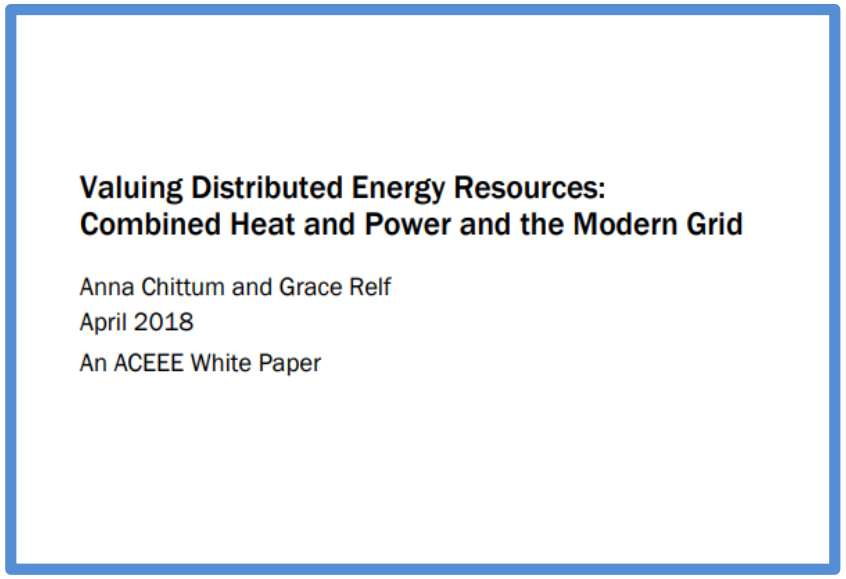

RESOURCE LINKS

[Roadmap to Resiliency]

[Best Practices in Business Planning for Energy Resiliency]

[Valuing Distributed Energy Resources]

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Roadmap to Resiliency

- ASHE Monograph (Technical White Paper)
- Authored by Powered for Patients and ASHE
- Aims to further discussions on emergency power best practices by
  - Considering lessons learned from previous disasters,
  - Explaining how to assess vulnerabilities
  - Suggesting new ways to safeguard emergency power through:
    - New technologies
    - Innovative protocols]
    - Best Practice

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Roadmap to Resiliency

- **Lessons Learned**
  - Flooding of emergency power system components is a chief culprit in emergency power system failures during hurricanes.
  - Insufficient pre-disaster coordination with generator service and fuel providers can result in delays in service at a time when it is most needed.
  - Failure to inventory critical spare parts for emergency power systems can result in lengthy delays in the restoration of emergency power.

- **Keys – Assessing & Preparing Before Disaster**
  - SAFER – Status, Analyze, Find, Evaluate, Reduce
  - Coordinate Services/Parts Before Hand

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Best Practices in Business Planning for Energy Resiliency

- ASHE Monograph
- Authored by Hospital Energy LLC
- Introduces best practices for business planning to support campus energy resiliency
  - Not Code Requirement Based
  - ASHE Supports this type of initiative

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Best Practices in Business Planning for Energy Resiliency

- Establish an empowered energy committee that includes leaders in facility, finance and supply chain management.
- Finance leaders must understand the opportunities and costs of energy resiliency.
- Address energy investments as part of a long-term facility master plan.

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Best Practices in Business Planning for Energy Resiliency

- The cost of hospital evacuation, in terms of patient safety, loss of revenue and facility reputation make energy investment vitally important.

- Place a financial value on loss avoidance (value for resiliency) and apply the value in the business planning model.

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Best Practices in Business Planning for Energy Resiliency

- CHP systems deliver continuous power for operations.
  - CHP generators and emergency generators can work in tandem to deliver energy reliability.
  - An array of multiple small engines is preferable over a single large unit in resiliency planning.
  - Design standardization and volume purchasing can drive costs down.

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Valuing Distributed Energy Resources: CHP and the Modern Grid

- American Council for an Energy-Efficient Economy (ACEEE) 2018 White Paper

- Designed to help facilities, communities, utilities, and customers affected by poor energy resiliency
  - Better assess the costs of disruptive events
  - Determine the value of mitigation strategy benefits

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Valuing Distributed Energy Resources: CHP and the Modern Grid

- **An asset's total value is difficult to calculate.**
  - **CHP resiliency benefits currently lack an agreed-upon and easily understood way to determine that value.**
  - **Should be based on site specific data.**
- **Stakeholders can/should develop a metric framework, collect/organize data to use in metric calculations.**
- **A metric with broad stakeholder acceptance can underpin the development of a consensus-based standard to help maximize energy resiliency.**

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Valuing Distributed Energy Resources: CHP and the Modern Grid

- An asset's total value can include losses avoided by its presence over time.
  - It boils down to risk and cost.
  - CHP provides premium resiliency benefits, better than standard emergency generators, yet is undervalued and underutilized.

- An asset's total value depends on the value of cash flows/losses avoided. There is no current market mechanism for valuing resiliency.

- Presents a survey of current tools and a proposed framework.

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Audience Survey

1) Have you experienced a utility power outage lasting more than one day?

2) Have you had an emergency generator fail to operate during a power outage?

3) Do you experience nuisance power “blips”?

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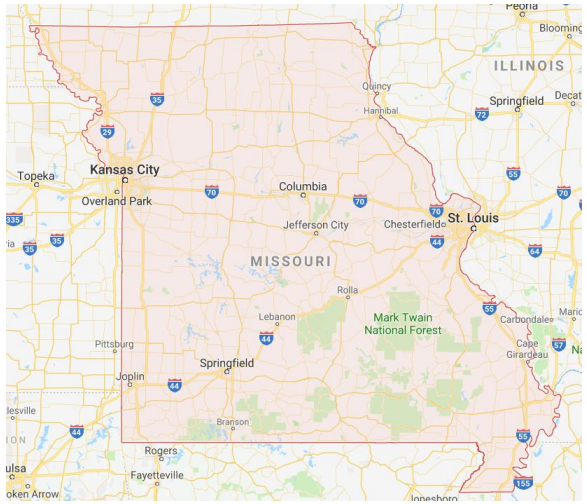

It happened in Missouri

2011 – AN INFAMOUS YEAR

Eastern Missouri

SSM DePaul Hospital experienced a 16-hour utility power outage on Good Friday (April 22) when an EF4 touched down near the St. Louis airport. Emergency generators functioned, but HVAC systems and normal operations were impacted. (An EF1 tornado affected the same area in June, 2013.)

Western Missouri

St. John's Regional Medical Center (now Mercy) in Joplin took a direct hit from an EF5 tornado on May 22. The hospital was damaged beyond repair. A new hospital incorporating "storm-hardened" safety features was built in near-record time.

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CMS EP Rule

- In 2016, the Centers for Medicare & Medicaid Services (CMS) adopted new emergency preparedness requirements. A hospital must have a strategy to keep backup power systems operational unless it plans to evacuate.
- Code minimum emergency power supply systems generally cover about 25% of a hospital's normal power load.
- A hospital must have a plan to maintain safe temperatures in patient care areas.

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CMS EP Rule

- Adding air conditioning to an emergency power supply system requires a system large enough to provide approximately 60% of a hospital's normal electrical load.

- Hospitals covering 60% of normal electrical load should consider covering 100% of normal load.

- Explore advanced power generation technologies such as combined heat and power (CHP) and microgrids to reduce reliance on the grid and bolster backup power capabilities. Redundancy is important.

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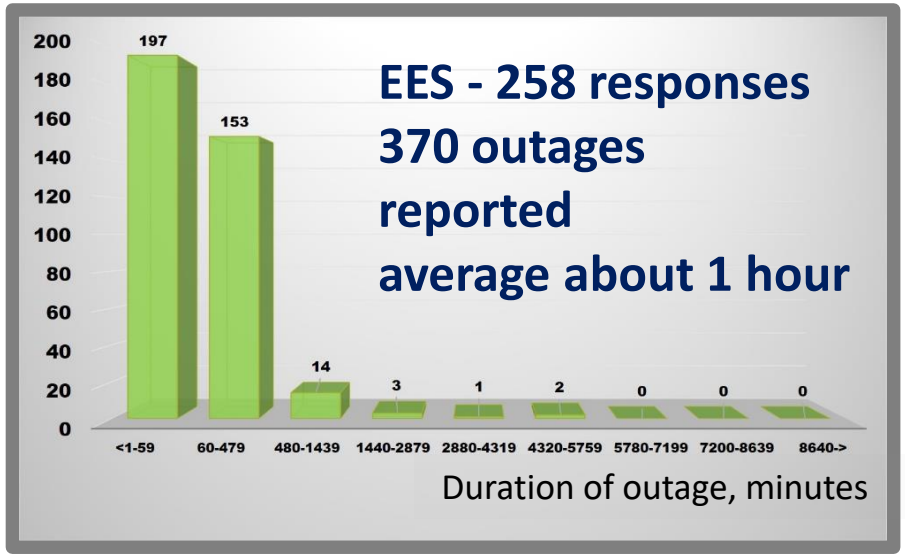
EES Survey

Nationwide - Facility Staff

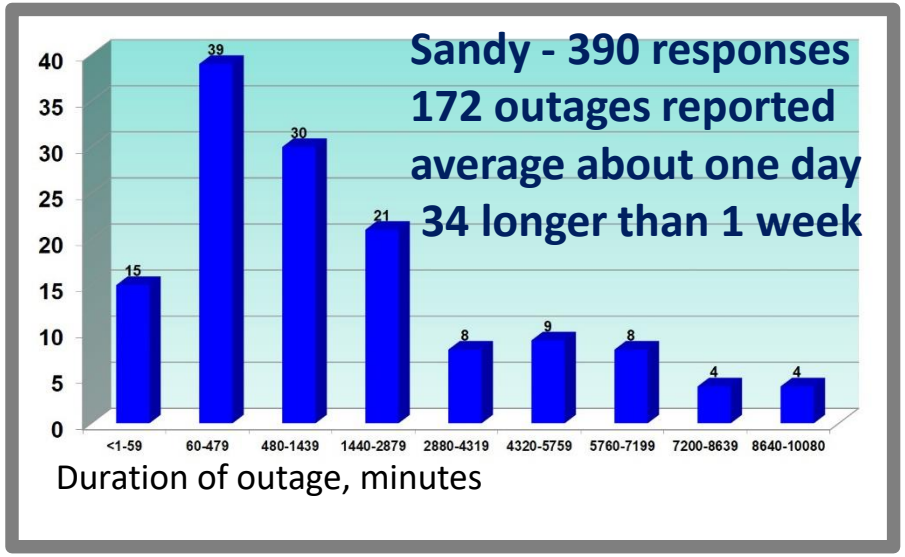
16.5 % of 1558 Responded



Sandy Survey

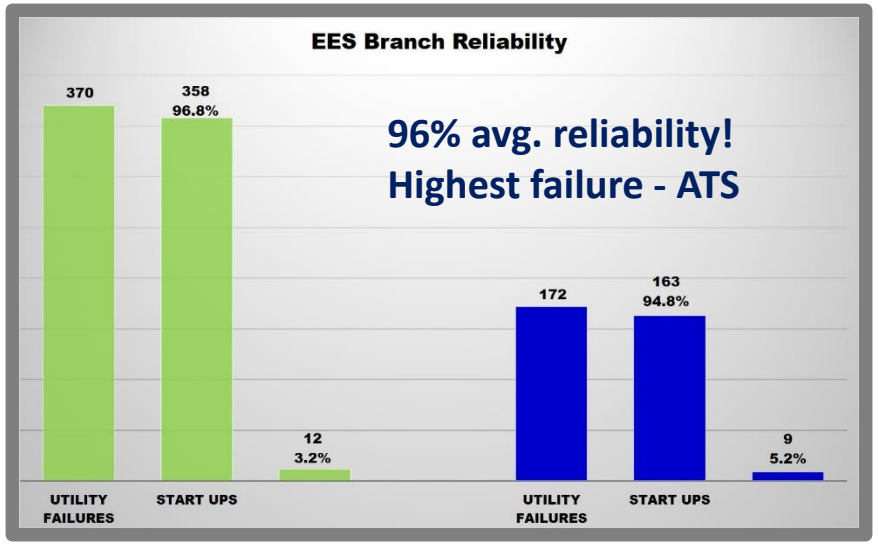
Sandy Region – Facility Staff

27 % of 1443 Responded



RESOURCE LINK

[Inside ASHE - Winter 2014 - Keeping the Power On]



How do you avoid becoming part of the 4%

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What Does This Mean?

- 5,534 Registered Hospitals in the US
  - Average 1 Utility Outage per Year
  - Anticipate 5,534 Utility Outages
- 96% Average EES Success Rate
  - Potential of 221 EES Failures this year
  - Typical Outage is between 22 to 78 minutes long
- Potential to Impact
  - 2,497 ICU Patients
  - 285 Surgeries
  - 18 Births

Also consider potential impact to diagnostic testing, lab results, business practices, etc. etc.

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Energy Resiliency: What's a Reasonable Value?

Excerpts from 2018 ACEEE Whitepaper

Valuing Distributed Energy Resources: Combined Heat and Power and the Modern Grid

Table 3. Estimated interruption costs per event (2013$) **Table 3 in 2013$** *Source:* Sullivan, Schellenberg, and Blundell 2015

Customer class	Momentary	30 min.	1 hour	4 hours	8 hours	16 hours
Medium and large commercial and industrial (C&I) facilities						
Cost per event	$12,952	$15,241	$17,804	$39,458	$84,083	$165,482
Cost per average kW	$16	$19	$22	$48	$103	$203
Cost per unserved kWh	$190	$37	$22	$12	$13	$13

Table 4. Estimated average electric customer interruption costs per event by duration (2008$)

Sector	Momentary	30 min.	1 hour	4 hours	8 hours
Medium and large C&I					
Trade & retail	$7,625	$10,113	$13,025	$37,112	$58,694
Finance, insurance, real estate	$17,451	$23,573	$30,834	$92,375	$147,219
Services	$8,283	$11,254	$14,793	$45,057	$71,997
Public administration	$9,360	$12,670	$16,601	$50,022	$79,793

Source: Sullivan et al. 2009 **Table 4 in 2008$**

Assume "services" category includes hospitals.

Consider data in both tables and escalate to 2018$

1 hour event cost ~ $20,000
8 hour event cost ~ $100,000
Reasonable or not?

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OUTAGES
How Big An Impact?

Opinion?

How much would an outage at an average sized (less than 200 beds) hospital with typical outpatient and diagnostic services cost?

A. Less than $100,000
B. $100,000 - $500,000
C. $500,000 - $1,000,000
D. More than $1,000,000

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OUTAGES
How Big An Impact?

The Real Numbers

Hospital continues to operate – doesn't close

Outpatient Clinics close – what is the business loss for closing a clinic?

Average of **390,000** annual Outpatient Visits
Works out to approximately **1,500** Visits/Day
Average visit charges $250
What does a 2 hour outage cost?
1,500/8 = 187.5 * 2 = 375 * $250 = **$93,750.00**

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Distributed Energy Resources Resiliency Value (DERRV)

DERRV is a term first used in the ACEEE April, 2018 whitepaper *Valuing Distributed Energy Resources: Combined Heat and Power and the Modern Grid*.

DERRV is a proposed metric framework to be developed via a stakeholder process which will then form the basis for a standard for valuing distributed energy resources (such as CHP). To find out more, contact Grace Relf at ACEEE

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Thank You!

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